



**QUEEN'S
UNIVERSITY
BELFAST**

Resilience in medical doctors: a systematic review

McKinley, N., Karayanis, P. N., Convie, L., Clarke, M., Kirk, S. J., & Campbell, W. J. (2019). Resilience in medical doctors: a systematic review. *Postgraduate Medical Journal*, [136135].
<https://doi.org/10.1136/postgradmedj-2018-136135>

Published in:
Postgraduate Medical Journal

Document Version:
Peer reviewed version

Queen's University Belfast - Research Portal:
[Link to publication record in Queen's University Belfast Research Portal](#)

Publisher rights

© 2019 The Authors. This work is made available online in accordance with the publisher's policies. Please refer to any applicable terms of use of the publisher.

General rights

Copyright for the publications made accessible via the Queen's University Belfast Research Portal is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

The Research Portal is Queen's institutional repository that provides access to Queen's research output. Every effort has been made to ensure that content in the Research Portal does not infringe any person's rights, or applicable UK laws. If you discover content in the Research Portal that you believe breaches copyright or violates any law, please contact openaccess@qub.ac.uk.

Title: Resilience in Medical Doctors: A Systematic Review

Corresponding Author:

Miss Nicola McKinley

Address:

Department of General Surgery,
Ulster Hospital,
Upper Newtownards Road,
Dundonald,
Belfast,
BT16 1RH.

Tel: +44(0)7891710729

Email: nmckinley01@qub.ac.uk

Co-Authors:

Mr Paul Nicholas Karayiannis,
Royal Victoria Hospital,
274 Grosvenor Rd,
Belfast,
BT12 6BA.

Mr Liam Convie

Department of General Surgery, Ulster Hospital,
Upper Newtownards Road,
Dundonald,
Belfast,
BT16 1RH.

Prof. Mike Clarke

Centre for Public Health, Queen's University Belfast,
Institute of Clinical Sciences,
Block A,
Royal Hospitals,
Belfast,
BT12 6BJ.

Mr Stephen Kirk

Department of General Surgery,
Ulster Hospital,
Upper Newtownards Road,
Dundonald,
Belfast,
BT16 1RH.

Mr William Jeffrey Campbell

Department of General Surgery,

Ulster Hospital,
Upper Newtownards Road,
Dundonald,
Belfast,
BT16 1RH.

Keywords:

Resilience (psychological)

Doctor

Physician

Clinician

Psychological wellbeing

Word count: 3808 (excluding title page, abstract, references, figures and tables.)

Main messages:

- Resilience has a complex, multi-factorial aetiology.
- Resilience is more than a doctor's own personal resource. Modifiable factors, such as social support and environmental contexts, are also key in determining a doctor's resilience.
- Mindfulness-based interventions to build resilience have not been shown to improve doctor's resilience scores on psychological testing.

Research questions:

- What influences resilience in doctors?
- How can we improve doctor's resilience?
- Are interventions to improve resilience in doctors effective?

Resilience in Medical Doctors: A Systematic Review

Abstract

Introduction

Resilience can be difficult to conceptualise and little is known about resilience in medical doctors.

Aims

This systematic review discusses the existing literature on influences on resilience levels of medical doctors.

Methods

The bibliographic databases PubMed, MEDLINE, EMBASE and PsycINFO were searched from 2008 to November 2018 using keyword search terms resilience* AND ("medical physician*" OR doctor* OR surgeon* OR medical trainee* or clinician*).

Results

Twenty-four studies were deemed eligible for inclusion. A narrative synthesis was performed. The following influences on resilience in doctors were identified; demographics, personality factors, organisational or environmental factors, social support, leisure activities, overcoming previous adversity and interventions to improve resilience.

Conclusions

Resilience is not limited to a doctor's own personal resource. Published studies also highlight the influence of other modifiable factors.

Resilience in Medical Doctors: A Systematic Review

Introduction

A career as a medical doctor may be incredibly rewarding, but it can also be exceptionally demanding.

Medical doctors are at a higher risk of anxiety, depression, substance abuse and suicide, when compared with the wider population.[1,2] The nature of their profession often results in exposure to elevated levels of stress, high pressure environments and feelings of uncertainty. Working closely with patients and the complexity of the doctor-patient relationship introduces a number of both positive and negative emotions. Long working hours and sleep deprivation have a detrimental effect on both physical and mental wellbeing.[3,4] Furthermore, the current litigious climate in some countries and increasingly regulated, administrative nature of the work are likely to be contributory factors to the increasing levels of burnout being reported by medical staff.

Resilience can be difficult to conceptualise. Derived from the Latin word *resilio* – to rebound or bounce back, one definition states that it is the ability to adapt well in the face of adversity or significant stress, even returning stronger afterwards.[5] However, a systematic review by Aburn *et al.* in 2015 concluded that there was no universal definition for resilience in the literature[6]. Instead, they identified five themes used to define resilience across the one hundred studies and 25 different population groups included in their analysis: rising above adversity, adapting and adjusting, resilience as a dynamic process, 'ordinary magic' and mental illness as a marker of resilience.[6]

It has been reported that inherent personality factors make an individual resilient. These include positive attitudes, optimism, the ability to regulate emotions and to see failure as a form of beneficial feedback.[7] It is also reported that acquired and modifiable factors, such as environment and social support, are important determinants of an individual's resilience.[8] Psychologists have debated whether these inherent internal factors or external factors are more important in determining an individual's resilience level.[9]

Although the physical health of doctors has been widely studied, and burnout has been reported on, little is known about resilience in doctors. Therefore, this systematic review discusses the existing literature on influences on resilience in medical doctors.

Methods

The objective of this review was to identify, summarise and critique the existing published information using a narrative synthesis.[10] This form of interpretative systematic review involves: (1) developing theories, (2) searching for evidence, (3) selecting articles, (4) extracting data, (5) developing a preliminary synthesis of findings, (6) exploring relationships in the data within and between studies, and (7) drawing conclusions. The 27-point PRISMA checklist for systematic reviews was taken into consideration when reporting this review.[11]

We hypothesised that resilience in doctors has a multi-factorial etiology with both inherent and acquired factors influencing their resilience levels. Initial reading of this literature revealed a paucity of research into resilience and medical doctors. The research question was therefore broad, given the limited number of studies on this particular topic: What is currently known about influences on resilience levels in doctors?

The bibliographic databases PubMed, MEDLINE, EMBASE and PsycINFO were searched on 8th November 2018 using the following search string; Psychological resilience OR resilien* AND ("medical physician*" OR doctor* OR clinician* OR surgeon* OR medical trainee*). The search was limited to studies published in the last ten years because resilience is a relatively recent psychological phenomenon. Papers published in languages other than English were excluded. (Appendix 1)

Results

The initial search yielded 1763 results (602 MEDLINE, 431 EMBASE, 532 PubMed and 197 PsycINFO). Duplicates (626) were removed. The remaining 1137 titles and abstracts were reviewed against the inclusion and exclusion criteria (table 1) by two independent reviewers (NM and PK).

Table 1. Inclusion and exclusion criteria.

Inclusion criteria	Exclusion criteria
Studies in which resilience was the main or one of the main topics of interest.	Published in a language other than English.
Quantitative and qualitative studies explicitly mentioning ‘resilience’ in the title or abstract that assessed resilience.	Studies with burnout or coping strategies, as opposed to resilience, as the main topic of interest.
Studies investigating resilience in medical doctors or medical trainees.	Studies of resilience in nurses, medical students and other allied health care professionals.
Studies on the influence of interventions to improve resilience in doctors that quantitatively or qualitatively assessed resilience levels after the intervention.	Unpublished literature, editorials, letters, opinion pieces, conference abstracts.

Thirty-one papers were retained. These 31 papers were read and reread in depth by two reviewers. Seven papers were excluded by both reviewers. One paper was excluded as its main focus was studying ‘grit’ and burnout in doctors, as opposed to resilience, which was defined as “the ability to persevere during difficulties and maintain a sustained effort over an extended period of time”.[12] Two papers were excluded as they investigated resilience in healthcare professionals including doctors but also nurses and in some cases medical students, with no breakdown in the results.[13,14] Three interventional studies were excluded.[15-17] One because it assessed feasibility of implementing resilience training for surgical interns, but did not assess if the training had any influence on resilience levels for these doctors.[15] Two were excluded as despite their titles (“Adaptation Practice: Teaching doctors how to cope with stress, anxiety and depression by developing resilience”[16] and “Stress and burnout in residents: impact of mindfulness-based resilience training”[17]), they did not include any measure of resilience. Finally, another paper was excluded as despite its title, (“Exploring public sector physicians’ resilience, reactions and coping strategies in times of economic crisis; findings from a survey in Portugal’s capital city area”), it did not measure resilience but focused on working hours and intention to migrate in doctors.[18] This resulted in a final count of 24 eligible papers (Figure 1).

Of these 24 papers, one was a systematic review of resilience of primary healthcare doctors, ten were quantitative studies of resilience in doctors, eight were qualitative studies that consisted of semi-structured interviews and five were interventional studies that

quantitatively or qualitatively assessed resilience levels after the author's intervention. Nine included studies were undertaken in the United States of America (New York, Ohio, Chicago, Oregon, Massachusetts and Philadelphia). There were six studies in Australia, one study in Canada, one in South Africa, two in the United Kingdom (Northern Ireland and England) and four studies in Germany. Most studies (including the systematic review) focused on resilience in family physicians or primary healthcare providers. There were also three studies of resilience in internal medicine physicians, two in obstetrics and gynecology residents, two in surgeons, one in paediatric residents and one that combined general practitioners, psychiatrists and surgeons. There was a range of healthcare settings investigated, with some studies focusing on rural healthcare specifically and others looking at large urban teaching hospitals. Table 2 outlines each included study.

Table 2. Included studies.

Title	Authors	Year	Study Design	Population	Sample size	Aim
A study of the relationship between resilience, burnout and coping strategies in doctors.[19]	McCain <i>et al.</i>	2018	Cross-sectional survey	Northern Ireland hospital doctors and GPs	283	To measure resilience, coping and professional quality of life in
A survey of resilience, burnout and tolerance of uncertainty in Australian general practice registrars.[20]	Cooke <i>et al.</i>	2013	Cross-sectional survey	Australian general practice registrars	128	Measure resilience, compassion satisfaction, personal meaning in work, care and tolerance of uncertainty in Australian general practice
Initial characterization of internal medicine resident resilience and association with stress and burnout.[21]	Bird <i>et al.</i>	2016	Cross-sectional survey	American internal medicine residents	77	Not stated.
What factors promote resilience and protect against burnout in first-year pediatric and medicine-pediatric residents?[22]	Olson <i>et al.</i>	2015	Cross-sectional survey	American paediatric medicine residents	45	Test a conceptual model of factors that might promote resilience and protect against burnout, which might be used as targets for addressing burnout in this group
Who attracts whom to rural general practice? Variation in temperament and	Eley <i>et al.</i>	2015	Cross-sectional survey	Australian rural GPs	451	Describe the personalities of general practitioners and trainees. To obtain information about

character profiles of GP registrars across different vocational training pathways.[23]						individuals choose practice
Resilience among Employed Physicians and Mid-Level Practitioners in Upstate New York.[24]	Waddimba <i>et al.</i>	2016	Cross-sectional survey	American doctors working in a rural healthcare network	308	To investigate the factors associated with resilience among medical professionals.
The relationship between resilience and personality traits in doctors: implications for enhancing well-being.[25]	Eley <i>et al.</i>	2013	Cross-sectional survey	Australian family practitioners	479	Examine the relationship between resilience to personal stressors and personality traits in order to identify key traits that predict resilience.
Exploring the impact of resilience, self-efficacy, optimism and organizational resources on work engagement.[26]	Mache <i>et al.</i>	2014	Cross-sectional survey	German hospital doctors-internal medicine, paediatric and neurology	223	Examine the relationship between personal and organisational resources and essential predictors of work engagement of German health care professionals
The prevalence of burnout and depression in medical doctors working in the Cape Town Metropolitan Municipality community healthcare clinics and district hospitals of the Provincial Government of the Western Cape: a cross-sectional study.[27]	Rossouw <i>et al.</i>	2013	Cross-sectional survey	South African primary healthcare doctors	132	To investigate burnout and depression in medical doctors in the context of work-related conditions and the role of resilience as a modifiable factor
Burnout and Stress Among US Surgery Residents: Psychological Distress and Resilience.[28]	Lebares <i>et al.</i>	2017	Cross-sectional survey	American surgical residents	566	To examine the psychological factors that can contribute to burnout vulnerability and resilience in a group of surgical trainees
An Evaluation of a Multicomponent Mental Competency and Stress	Mache <i>et al.</i>	2015	Interventional study	German surgeons	68	To develop a training program to teach different stress management and coping techniques and a

Management Training for Entrants in Surgery Medicine.[29]						individual conditions for surgeons before course.
Evaluation of self-care skills training and solution focused counselling for health professionals in psychiatric medicine: a pilot study.[30]	Mache <i>et al.</i>	2016	Interventional study	German psychiatric physicians	76	To implement a self-care skills training solution-focused counselling to support psychiatrists.
Abbreviated Mindfulness Intervention for Job Satisfaction, Quality of Life, and Compassion in Primary Care Clinicians: A Pilot Study.[31]	Fortney <i>et al.</i>	2013	Interventional study	American primary care physicians	30	Investigating if a mindfulness intervention could increase job satisfaction, quality of life, and compassion in primary care clinicians.
A curriculum to enhance Resilience in Internal Medicine Interns.[32]	Bird <i>et al.</i>	2017	Interventional study	Internal medicine residents, Chicago	81	To implement a curriculum to teach resilience in internal medicine residents.
A Brief Mindfulness-Based Intervention (MBI) for Primary Care Physicians: A Pilot Randomized Control Trial.[33]	Schroeder <i>et al.</i>	2016	Interventional study	Primary care physicians, Oregon	33	To explore whether MBI would reduce burnout and stress and increase mindfulness and compassion from baseline to follow up.
Influences on GP coping and resilience: a qualitative study in primary care.[34]	Cheshire <i>et al.</i>	2017	Focus groups and interviews	English GPs	22	To explore GPs' experiences of workplace challenges and stresses.
Building physician resilience.[35]	Jensen <i>et al.</i>	2008	Semi-structured interviews	Canadian family physicians	17	To explore the determinants of family physician resilience.
Thriving in scrubs: a qualitative study of resident resilience.[36]	Winkel <i>et al.</i>	2018	Semi-structured interviews	American obstetric and gynaecology residents	18	To understand how resilience develops during residency.
Physician resilience: a grounded theory study of obstetric and gynaecology residents.[37]	Winkel <i>et al.</i>	2018	Semi-structured interviews	American obstetric and gynaecology residents	18	To understand how resilience develops during residency.
Resilience among doctors who work in challenging areas: a qualitative study.[38]	Stevenson <i>et al.</i>	2011	Semi-structured interviews	Australian primary care practitioners	15	To describe attitudes and job satisfaction of Australian primary care practitioners who work in challenging areas.

						worked for more years in areas of disadvantage.
If Every Fifth Physician Is Affected by Burnout, What About the Other Four? Resilience Strategies of Experienced Physicians.[39]	Zwack <i>et al.</i>	2013	Semi-structured interviews	German physicians, GPs, psychiatrists and surgeons	200	To identify health strategies employed by experienced physicians in order to define the resilience process and aspect of resilience in preventive action
Exploring resilience in rural GP registrars-implications for training.[40]	Walters <i>et al.</i>	2015	Semi-structured interviews	Australian GP registrars	18	To explore GP registrars' perceptions of their resilience and strategies used to maintain it
Promoting Resiliency among Palliative Care Clinicians: Stressors, Coping Strategies, and Training Needs.[41]	Perez <i>et al.</i>	2015	Semi-structured interviews	American Palliative care clinicians (PCC)	15	To explore common stressors, coping strategies, and training needs of PCCs in efforts to develop a Resiliency Program
Resilience of primary healthcare professionals: a systematic review.[42]	Robertson <i>et al.</i>	2016	Systematic review	Primary healthcare doctors	-	To investigate resilience modifiable factors and explore factors associated with burnout.

The quantitative studies all assessed individuals using validated psychological measures of resilience that asked clinicians to score themselves on a Likert scale. The Smith *et al.* Brief Resilience Scale (BRS) (in 2 studies),[43] the Resilience Scale and the Resilience Scale-14 (3 studies),[44] Brief Resilient Coping Scale (BRCS) (1 study),[45] the Connor Davidson Resilience Scale (CD-RISC) (3 studies)[46] and the Block Ego-Resiliency Scale[47] (1 study) were used to score physicians resilience levels.

Eight qualitative studies were identified for inclusion in this review. All used semi-structured interviews and most analysed transcripts using a grounded theory approach. One used focus groups in addition to semi-structured interviews[34]. Information was extracted from each included study on factors identified that influenced resilience levels of doctors.

Preliminary synthesis of findings

Demographic influences

The influence of demographics such as age, gender or marital status on resilience has been widely discussed in other groups of professionals.[48,49] The majority of the quantitative studies in this review assessed whether participant's demographics had any relationship with resilience levels. Nine of the ten eligible quantitative studies reported on the demographics of the doctors. The study by Bird *et al.*[21] into resilience in American internal medicine residents was not able to analyse demographic associations with resilience due to a poor response to demographic questions. Eight of the other nine studies found that demographic variables (such as age, gender or marital status) had no influence on resilience scores[19-20,22,24-28]. One study, by Eley *et al.*[23] of rural general practitioners in Australia found that the oldest group of doctors (aged 52-61 years) had higher resilience levels ($p=0.01$).

Personality traits and resilience

Previous studies in other groups of people have recognised the importance of other inherent personality factors that make an individual resilient, including positive attitudes, optimism, and the ability to regulate emotions.[4] Across the studies in this review, resilience had strong and significant relationships with personality traits that support high functioning in a stressful and demanding environment. Eley's study examined the relationship of other personality traits to resilience in Australian family physicians to identify personality traits that are positively associated with resilience.[25] Resilience was most strongly positively correlated with high Self-directedness and strongly negatively correlated with Harm Avoidance. Resilience was moderately positively correlated with high Persistence and high Cooperativeness.

Similar influences of personality were confirmed in Waddimba *et al.*'s[24] study of New York physicians and Cooke *et al.*'s[20] study of Australian general practitioners (GPs). Doctors with a higher tolerance of clinical uncertainty were significantly more resilient.[20] In studies of paediatric and surgical residents, high levels of resilience correlated with high levels of self-compassion and mindfulness.[22,28] The authors of those studies concluded that mindfulness is a potentially modifiable personality trait that is associated with resilience and is protective against stress.[28] Eley suggested that resilience should be considered in the context of multiple components of personality.[25]

Social support and resilience

For doctors, the influence of social support in both a professional and a personal capacity were identified across the review as important factors in determining resilience.[24,34-41] Quantitatively, Waddimba *et al*'s[24] study of New York physicians that scored doctors for resilience and assessed unit characteristics reported that clinicians who worked on a smaller clinical unit (<5 practitioners) scored significantly lower for resilience than those who worked on larger units. Waddimba concluded from this that the social support of colleagues was an important determinant of a doctor's resilience. They also found that high resilience scores positively correlated with relatedness; feelings of being connected or understood in the workplace and stressed the need to enhance professional teamwork and the building of supportive networks for clinicians to improve work place resilience.

This was a similar theme across the qualitative studies. Zwack conducted semi-structured interviews with 200 doctors from a wide range of medical specialities.[39] After leisure time activity, social interaction with colleagues (such as exchanging opinions and experiences with peers, as well as feedback from colleagues) was the second most commonly used behaviour that doctors believed improved their resilience.[39] In particular, support from more senior colleagues, such as a GP supervisor or trainer, was important in developing resilience and building confidence.[40] Relationships with family and friends was another key influence highlighted across multiple studies.[34-41] Of note, Walters *et al*'s[40] study of resilience in GP registrars found that some trainees believed their resilience was challenged when they were socially isolated whilst working in rural communities, distanced from immediate family.

Outside interests and resilience

Outside interests were found to be a method for managing stress and influencing resilience in doctors in some studies.[34-35,38-41] In the Perez *et al*.[41] study of Palliative Care clinicians, engaging in healthy behaviours and hobbies was the most common method of coping with stressors. Participants engaged in physical activity, including walking, running, dancing, hiking, and biking. Stress-reducing hobbies included cooking, gardening, reading, or knitting. Similarly, in Zwack's study of experienced and resilient physicians, leisure activity was the most common method used to relieve stress.[39] Sporting activity was an immediate way of reducing tension and facilitated a change of mental focus. Alongside physical activity, participants engaged in cultural matters such as music, literature, or art as an outside interest.

Zwack concluded that this finding was useful for those doctors seeking to develop resilience through preventive behaviours, again suggesting that resilience is in part modifiable.[39]

Environmental influences and resilience

Only two studies in particular investigated environmental influences on resilience scores.[24,26] However, many of the qualitative studies identified organisational factors as important in influencing doctor's resilience.[34-35,38] Waddimba *et al's*. [24] study scored New York doctors for resilience and assessed service unit characteristics. In their sample, 63.9% of participants scored high for resilience. They found a positive correlation between high resilience scores and a lighter workload. They concluded that higher perceived workloads increase job stress. Mache's study aimed to assess if resilience and organisational resources had any influence on clinicians' work engagement.[26] Resilience was also positively correlated with work engagement as was job resources such as opportunities for career development, influence at work and degrees of freedom in the work place.

Stevenson *et al*. [38] investigated working conditions in primary health care doctors who worked specifically with a disadvantaged population. These doctors had a sense of control over their working lives, with fourteen of the fifteen choosing to work part-time. This was not as a result of feeling (or being) burnt out, but as a way of maintaining control over their career and pursuing other interests such as lecturing students. There was a similar theme of part-time working in Cheshire *et al's*. [34] study of English GPs, who stated part-time working helped them regain some work-life balance and improve resilience. Jensen's work with Canadian family doctors also highlighted the importance of a sense of control over one's working life in building resilience.[35] Both Stevenson and Jensen concluded that having the opportunity and freedom to organise their own working life and pursue other interests protected doctors from work-associated stress.[35,38]

Adversity as an influence on resilience

Winkel interviewed eighteen obstetric and gynaecology residents working in New York.[36,37] All were good standing trainees suggesting that the researchers may have selected individuals who were highly resilient; able to manage their rota commitments and adhere to academic standards. The idea of resilience being developed through adversity was identified.[36] Residents who had encountered difficult challenges before their working life appeared to struggle less with the stresses of the job, self-doubt, responsibility and medical

error suggesting they had developed their resilience. At follow up interviews 3-6 months later, the doctors in Winkel's study highlighted a growing confidence in the normality of encountering difficulties in their career and in now having personalised strategies to cope.[37]

Similar to the obstetric and gynaecology residents in Winkel's study,[36,37] the GP registrars in Walter's study acknowledged that exposure to challenging experiences and "not having things easy," both in their personal and professional lives, was an important factor in their learning of how to become more resilient and cope with difficult experiences.[40]

Interventions to improve resilience

We identified five interventional studies that aimed to improve doctors' resilience and assessed the influence of an intervention on resilience.[29-33] Resilience building interventions took a variety of forms. The majority were delivered in group settings to trainees or residents over a number of weeks and all assessed resilience using a validated psychological measure before undertaking the programme, and at one or more time points after the programme was delivered. Two interventional studies lacked a control group.[31,32]

Three out of the five interventional studies encouraged mindfulness or involved mindfulness-based interventions.[31-33] Mindfulness based interventions are comprised of mental training to enhance one's ability to nonjudgmentally attend to the present moment. This aims to cultivate a clear thinking mental state.[50] Through mindfulness practice, unhelpful habitual thoughts and behaviours can be recognised, allowing for new ways of responding.[50] Two studies focused solely on mindfulness as a means of improving physician mental wellbeing and building resilience.[31,33] Two studies by Mache *et al.*[29,30] focused on self-care skills training combined with cognitive-behavioural and solution-focused counselling in psychiatrists and surgeons. The final study had devised their own resiliency building curriculum.[32]

All studies used validated psychological tests to measure resilience before and after the intervention. Only the self-care skills training programme implemented by Mache in psychiatrists and surgeons, identified a significant improvement in resilience scores as a result of an intervention.[29,30] Two mindfulness-based studies found that the post-intervention mean resilience score was lower than the pre-intervention mean resilience

score.[32,33] Despite resilience scores generally not improving, when authors asked for feedback on their programs the majority of doctors who had attended stated that they had found their intervention useful and had learnt something meaningful.[32] Some participants stated that the intervention had fostered better peer relations and formed an additional support system.[32]

Only one study had the aim of investigating resilience in order to develop a resiliency programme.[41] In a study of American Palliative Care clinicians, the doctors cited that they wanted a resiliency programme made up of training in mind-body skills (breathing, yoga, meditation), health education about the effects of stress, and cognitive strategies to help reduce ruminative thoughts and negative self-talk.[41] The majority of the clinicians stressed the need for brief strategies that could be readily integrated in the workplace. The authors concluded that a skill-building approach to stress reduction,[41] similar to Mache's intervention,[29,30] would impart strategies that could be readily used during work hours.

Overall synthesis of findings

This review highlighted the complex, multi-factorial nature of resilience. Influences on resilience levels of doctors include personality factors, organisational factors, social support (both from peers and on a personal level), outside interests and overcoming previous adversity. Demographics and mindfulness-based interventions to improve resilience do not appear to have an influence on resilience.

Discussion

Twenty-four studies were included in this systematic review of influences on resilience in medical doctors, confirming the paucity of research into this subject. Winkel developed a useful conceptual model of resident resilience illustrated as a tree within its environment that highlights the idea that resilience is multi-factorial and a dynamic, evolving concept.[36,37] This model depicts the majority of influences on resilience that have been identified in this review.

The trunk of the tree (or the core of resilience), she states, is the process of becoming a doctor. The roots are support from family and community values, relationships within the medical community and connections to patients. The tree grows towards the sun, which depicts professional values and aspirations. Leaves represent fuel to develop as a doctor some of which are personality characteristics (such as determination and persistence) as well as

coping mechanisms. Environmental elements cause adversity and challenges that can unsettle the tree but also provide water for growth. A watering can demonstrates programmes and interventions that can cultivate resilience.[36,37]

There are limitations in this review. The searches were limited to the English language and the last 10 years, which may have excluded some studies. The results of all quantitative papers were based on voluntary self-reported questionnaires resulting in response and measurement bias. The sampling methods used in most studies may have attracted doctors who were interested in resilience and had time to participate. Although all the instruments used to measure resilience were validated, a wide range of psychological tests were used making it difficult to compare results from individual studies. In addition, all quantitative studies were cross-sectional and as a result, cause and effect between variables cannot be implied. Only certain variables (such as demographics) have been examined across many studies, and service unit characteristics were only investigated in two studies.

The study sample includes physicians from Australia, the United States of America, Canada, South Africa, Northern Ireland, England and Germany. However, although this review encompasses a variety of medical professionals and various healthcare settings worldwide, it is difficult to ascertain the generalizability of these findings to different healthcare systems. The concept of generalization through context similarity or ‘transferability’ would suggest that further information on the context of each qualitative study may have improved the generalizability of findings.[51] In addition, the small number of participants in the qualitative studies may mean the results cannot be widely applied. However, similar patterns and themes were identified across the review for the influences on resilience.

Demographic factors seem unlikely to have any important influence on an individual’s resilience level.[19-20,22,24-28] However, other personality factors, which are in part modifiable, such as self-directedness, low harm avoidance or risk aversion, persistence, cooperativeness, self-compassion and mindfulness do positively correlate with higher resilience.[20,22,24-25,28] Personality traits are not fixed.[52] This offers an opportunity to counsel doctors to improve insight into their individual personality traits and, perhaps, to improve their resilience. This may mean that doctors can be educated on how to best manage their own mental well-being when dealing with stress and challenges in the workplace, improving their resilience.

Environmental influences are also key. In particular, a degree of freedom within the workplace and opportunities for career development positively correlate with resilience and work engagement.[24,26] A sense of control over one's working life with the opportunity to work part-time fosters resilience.[35,38] The studies included in this review investigated resilience in groups of clinicians who differed widely in terms of medical speciality and degree of seniority. However, the common themes of peer social support and supportive relationships outside of medicine have consistently been identified as factors that build resilience.[24,34-41] As concluded by several researchers, the importance of enhancing professional teamwork and the building of supportive networks for clinicians is necessary to improve work place resilience.[24,26]

Interventions to improve resilience, in particular, mindfulness-based interventions, have not been shown to increase doctor's resilience when scored pre- and post-intervention on validated psychological tests.[31-33] However, subjectively, doctors who attended these programs did find them useful.[32] Some authors argue that after these interventions, doctors are more insightful with regard their own resilience, and as a result score themselves lower on their post-intervention resilience scale. They also argue that the phenomenon of resilience is an ever changing process that may vary, regardless of any intervention.[32] This may mean that these interventions do offer some benefit in increasing resilience and therefore improving professional quality of life for doctors. Of note, the two studies that did find a significant increase in post-intervention resilience were self-care skills training programme with cognitive behavioural and solution-focused counselling, suggesting future work evaluating these interventions may be useful.[29,30]

This review challenges the idea that resilience is a doctor's personal resource only, with no consideration given to the environment he or she lives or works in. The General Medical Council (GMC) and other organisations, such as the British Medical Association (BMA), offer workshops and seminars for UK physicians to improve their resilience and whilst well meaning, these may not offer much benefit.[53,54] These interventions aim to increase doctors' productivity and resilience but neglect the social and organisational contexts that may have a detrimental effect.

Further work to assess resilience in NHS clinicians would be useful, as only two studies were identified that focussed on resilience in UK doctors.[19,34] If doctors working in the UK healthcare system do have low levels of resilience, then appropriate evidence-based interventions may be worthwhile. By cultivating resilience, like the watering can in Winkel's depiction of resident resilience,[36,37] these workshops may lower the incidence of clinician burnout. However, if NHS doctors already have high resilience, improving personal resilience further may not offer much benefit to their work-related quality of life.

Conclusions

In conclusion, this systematic review highlights the complex, multi-factorial nature of resilience. Personality factors influence resilience and may offer an opportunity to improve resilience by counselling doctors with regards their individual personality traits. However, resilience is not limited to a doctor's own personal resource, and some studies have highlighted the influence of modifiable factors such as organisational contexts (workload, working environment), social support and leisure time activities. Interventions to improve resilience, in particular mindfulness-based interventions, do not significantly increase doctors' resilience scores, raising the question, do they offer a benefit to professional quality of life?

Contributorship Statement

NM designed the study and the search strategy. NM and PK were responsible for conducting the search and analysing the search results. The initial draft of the manuscript was prepared by NM then circulated among PK, LC, MC, SJK and WJC for critical revision. NM, PK, LC, MC, SJK and WJC helped to evolve analysis plans, interpret data and critically revise successive drafts of the manuscript. All authors approved the final version of this manuscript.

Funding- none

Competing interests- none

References

1. Shanafelt TD, Boone S, Tan L, *et al.* Burnout and satisfaction with work-life balance among US physicians relative to the general US population. *Arch Intern Med* 2012; 172:1377–85.
2. Mason S, O'Keeffe C, Carter A, *et al.* A longitudinal study of well-being, confidence and competence in junior doctors and the impact of emergency medicine placements. *Emerg Med J* 2016;33:91–8.

3. Costa G., Accattoli M.P., Garbarino S., Magnavita N., Roscelli F. Sleep disorders and work: Guidelines for health surveillance, risk management and prevention. *Med Lav* 2013;104:251–66.
4. Garbarino S., Lanteri P., Durando P., Magnavita N., Sannita W.G. Co-Morbidity, Mortality, Quality of Life and the Healthcare/Welfare/Social Costs of Disordered Sleep: A Rapid Review. *Int J Environ Res Public Health* 2016;13:831.
5. Wingo A.P., Fani N., Bradley B., Ressler K.J. Psychological resilience and neurocognitive performance in a traumatized community sample. *Depression and Anxiety* 2010;27(8):768–74. doi:10.1002/da.20675.
6. Aburn G, Gott M, Hoare K. What is resilience? An Integrative Review of the empirical literature. *J Adv Nurs* 2016;72(5):980-1000.
7. Tugade MM, Fredrickson BL, Barret L. Psychological resilience and positive emotional granularity. *J Pers* 2004;72:1161–90.
8. Ozbay F, Fitterling H, Charney D, *et al.* Social support and resilience to stress across the life span: a neurobiologic framework. *Curr Psychiatry Rep* 2008;10:304–10.
9. Levine S. Psychological and social aspects of resilience: a synthesis of risks and resources. *Dialogues in Clinical Neuroscience* 2003;5(3):273-80.
10. Popay J. *et al.* Guidance on the Conduct of Narrative Synthesis in Systematic Reviews. A Product from the ESRC Methods Programme. Version 1: April 2006
11. Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *BMJ* 2009;339:b2535.
12. Halliday L, Walker A, Vig S, Hines J, Brecknell J. Grit and burnout in UK doctors: a cross-sectional study across specialities and stages of training. *Postgrad Med J* 2017;93(1101):389-94.
13. Leners C, Sowers R, Quinn Griffin MT, Fitzpatrick JJ. Resilience and professional quality of life among military healthcare providers. *Issues Ment Health Nurs.* 2014 Jul;35(7):497-502.
14. Lala AI, Sturzu LM, Picard JP, Druot F, Grama F, Bobirnac G. Coping behavior and risk and resilience stress factors in French regional emergency medicine unit workers: a cross-sectional survey. *J Med Life.* 2016;9(4):363-368.
15. Lebares CC, Hershberger AO, Guvva EV, Desai A, Mitchell J, Shen W, Reilly LM, Delucchi KL, O'Sullivan PS, Ascher NL, Harris HW. Feasibility of Formal Mindfulness-Based Stress-Resilience Training Among Surgery Interns: A Randomized Clinical Trial. *JAMA Surg* 2018;153(10):e182734.
16. Clive Sherlock & Chris John. Adaptation Practice: Teaching doctors how to cope with stress, anxiety and depression by developing resilience. *BJMP* 2016;9(2):a916
17. Goldhagen BE, Kingsolver K, Stinnett SS, Rosdahl JA. Stress and burnout in residents: impact of mindfulness-based resilience training. *Adv Med Educ Pract.* 2015;6:525-32.
18. Russo G, Pires CA, Perelman J, Gonçalves L, Barros PP. Exploring public sector physicians' resilience, reactions and coping strategies in times of economic crisis; findings from a survey in Portugal's capital city area. *BMC Health Serv Res* 2017;17:207.
19. McCain RS, McKinley N *et al.* A study of the relationship between resilience, burnout and coping strategies in doctors. *Postgrad Med J* 2018;94:43-7.
20. Cooke GP, Doust JA, Steele MC. A survey of resilience, burnout, and tolerance of uncertainty in Australian general practice registrars. *BMC Med Educ* 2013;13:2. doi:10.1186/1472-6920-13-2.

21. Bird, AN, Pincavage AT. Initial Characterization of Internal Medicine Resident Resilience and Association with Stress and Burnout. *Journal of Biomedical Education*. 2016. 1-4. 10.1155/2016/3508638.
22. Olson K, Kemper KJ, Mahan JD. What factors promote resilience and protect against burnout in first-year pediatric and medicine-pediatric residents? *J Evid Based Complementary Altern Med* 2015;20(3):192-8.
23. Eley DS, Laurence C, Cloninger CR, Walters L. Who attracts whom to rural general practice? Variation in temperament and character profiles of GP registrars across different vocational training pathways. *Rural Remote Health* 2015;15(4):3426.
24. Waddimba AC, Scribani M, Hasbrouck MA, Krupa N, Jenkins P, May JJ. Resilience among Employed Physicians and Mid-Level Practitioners in Upstate New York. *Health Serv Res* 2016;51(5):1706-34.
25. Eley DS, Cloninger CR, Walters L, Laurence C, Synnott R, Wilkinson D, Abdullah J. The relationship between resilience and personality traits in doctors: implications for enhancing well being. *PeerJ* 2013;1:e216.
26. Mache S, Vitzthum K, Wanke E, David A, Klapp BF, Danzer G. Exploring the impact of resilience, self-efficacy, optimism and organizational resources on work engagement. *Work* 2014;47(4):491-500.
27. L Rossouw, S Seedat, RA Emsley, S Suliman, D Hagemester. The prevalence of burnout and depression in medical doctors working in the Cape Town Metropolitan Municipality community healthcare clinics and district hospitals of the Provincial Government of the Western Cape: a cross-sectional study. *South African Family Practice* 2013;55(6):567-73.
28. Lebares CC, Guvva EV, Ascher NL, O'Sullivan PS, Harris HW, Epel ES. Burnout and Stress Among US Surgery Residents: Psychological Distress and Resilience. *J Am Coll Surg*. 2018 Jan;226(1):80-90.
29. Mache S, Danzer G, Klapp B, Groneberg DA. An Evaluation of a Multicomponent Mental Competency and Stress Management Training for Entrants in Surgery Medicine. *J Surg Educ* 2015;72(6):1102-8.
30. Mache S, Bernburg M, Baresi L, Groneberg DA. Evaluation of self-care skills training and solution-focused counselling for health professionals in psychiatric medicine: a pilot study. *Int J Psychiatry Clin Pract* 2016;20(4):239-44.
31. Fortney L, Luchterhand C, Zakletskaia L, et al. Abbreviated mindfulness intervention for job satisfaction, quality of life and compassion in primary care clinicians: a pilot study. *Ann Fam Med* 2013;11(5):412-20.
32. Bird AN, Martinchek M, Pincavage AT. A Curriculum to Enhance Resilience in Internal Medicine Interns. *J Grad Med Educ* 2017;9(5):600-4.
33. Schroeder DA, Stephens E, Colgan D, Hunsinger M, Rubin D, Christopher MS. A Brief Mindfulness-Based Intervention for Primary Care Physicians: A Pilot Randomized Controlled Trial. *Am J Lifestyle Med* 2016;12(1):83-91.
34. Cheshire A, Ridge D, Hughes J, Peters D, Panagioti M, Simon C, Lewith G. Influences on GP coping and resilience: a qualitative study in primary care. *Br J Gen Pract* 2017;67(659):e428-e436.
35. Jensen PM, Trollope-Kumar K, Waters H, Everson J. Building physician resilience. *Can Fam Physician* 2008;54(5):722-9.
36. Winkel AF, Honart AW, Robinson A, Jones A-A, Squires A. Thriving in scrubs: a qualitative study of resident resilience. *Reprod Health* 2018;15:53.
37. Winkel AF, Robinson A, Jones AA, Squires AP. Physician resilience: a grounded theory study of obstetrics and gynaecology residents. *Med Educ*. 2018 Oct 16. doi: 10.1111/medu.13737. [Epub ahead of print]

38. Stevenson AD, Phillips CB, Anderson KJ. Resilience among doctors who work in challenging areas: a qualitative study. *Brit J Gen Pract* 2011;61(588).
39. Zwack J, Schweitzer J. If Every Fifth Physician Is Affected by Burnout, What About the Other Four? Resilience Strategies of Experienced Physicians. *Acad Med* 2013;88(3):382–9.
40. Walters L, Laurence CO, Dollard J, Elliott T, Eley DS. Exploring resilience in rural GP registrars- implications for training. *BMC Med Educ* 2015;15(1):1.
41. Perez GK, Haime V, Jackson V, Chittenden E, Mehta DH, Park ER. Promoting Resiliency among Palliative Care Clinicians: Stressors, Coping Strategies, and Training Needs. *J Palliat Med* 2015;18(4):332-7.
42. Robertson HD, Elliott AM, Burton C, Iversen L, Murchie P, Porteous T, Matheson C. Resilience of primary healthcare professionals: a systematic review. *Brit J Gen Pract* 2016;66(647):e423-33.
43. Smith BW, Dalen J, Wiggins K, Tooley E, Christopher P, Bernard J. The Brief Resilience Scale: Assessing the Ability to Bounce Back. *Int J Behav Med* 2008;15:194–200
44. Wagnild, G.M., Young, H.M. Development and psychometric evaluation of the Resilience Scale. *J Nurs Measurement* 1993;1(2):165-78.
45. Sinclair, V.G., Wallston, K.A. The development and psychometric evaluation of the Brief Resilient Coping Scale. *Assessment* 2004;11(1):94-101.
46. Connor KM, Davidson JR. Development of a new resilience scale: the Connor-Davidson Resilience Scale (CD-RISC). *Depress Anxiety* 2003;18(2):76-82.
47. The Ego Resilience Scale. Source: J. Block & Kremen, 1996.
48. Balmer GM, Pooley J, Cohen L. Psychological resilience of Western Australian police officers: relationship between resilience, coping style, psychological functioning and demographics. *Police Pract Res: An International J* 2013;15(4):270-82.
49. Ang SY, Uthaman T, Ayre TC, Mordiffi SZ, Ang E, Lopez V. Association between demographics and resilience – a cross-sectional study among nurses in Singapore. *Int Nurs Rev* 2018;65(3):459-66.
50. Bishop SR, Lau M, Shapiro S, *et al.* Mindfulness: a proposed operational definition. *Clin Psychol Sci Pract* 2004;11:230-241.
51. Larsson S. A pluralist view of generalization in qualitative research. *Int J Res Meth Educ*, 2009; 32:1, 25-38.
52. Roberts BW, Mroczek D. Personality Trait Change in Adulthood. *Curr Dir Psychol Sci.* 2008;17(1):31-35.
53. Cole-King A. Doctors under pressure need resilience, not mental toughness. GMC word press online, 15 July 2015.
54. BMA events. Facilitator: McGilvery A. Resilience & Mindfulness; Practical strategies to help build your resilience.
<https://www.bma.org.uk/events/2018/february/resilience-and-mindfulness>.

Figure 1. PRISMA Flow Diagram.

Appendix 1. Search terms used.